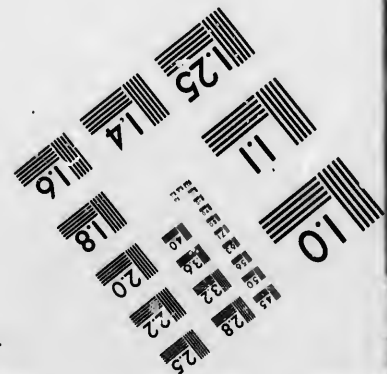
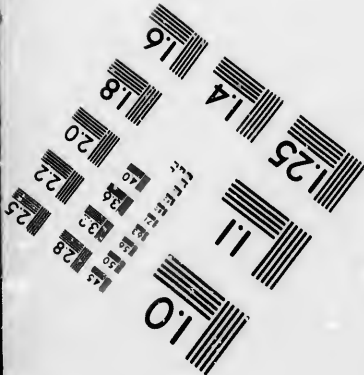
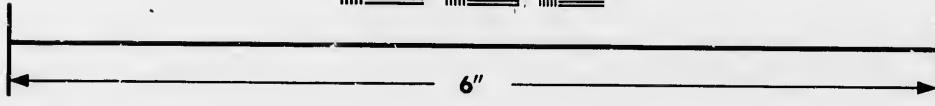
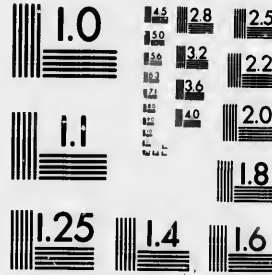


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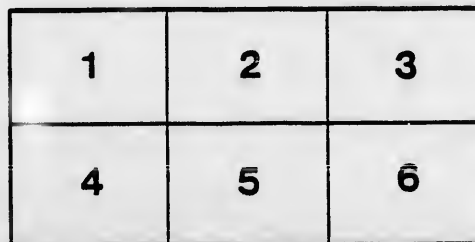
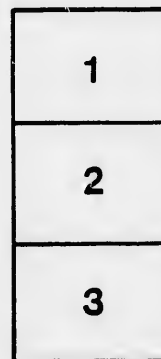
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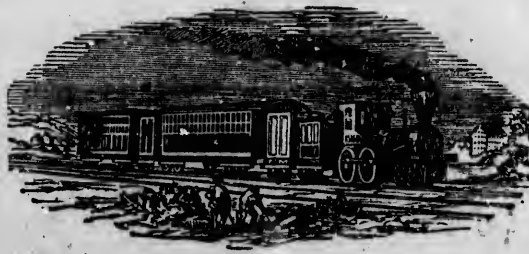
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CHIEF ENGINEER'S REPORT,

ADOPTED BY

THE BOARD OF DIRECTORS,

May 21, 1852.

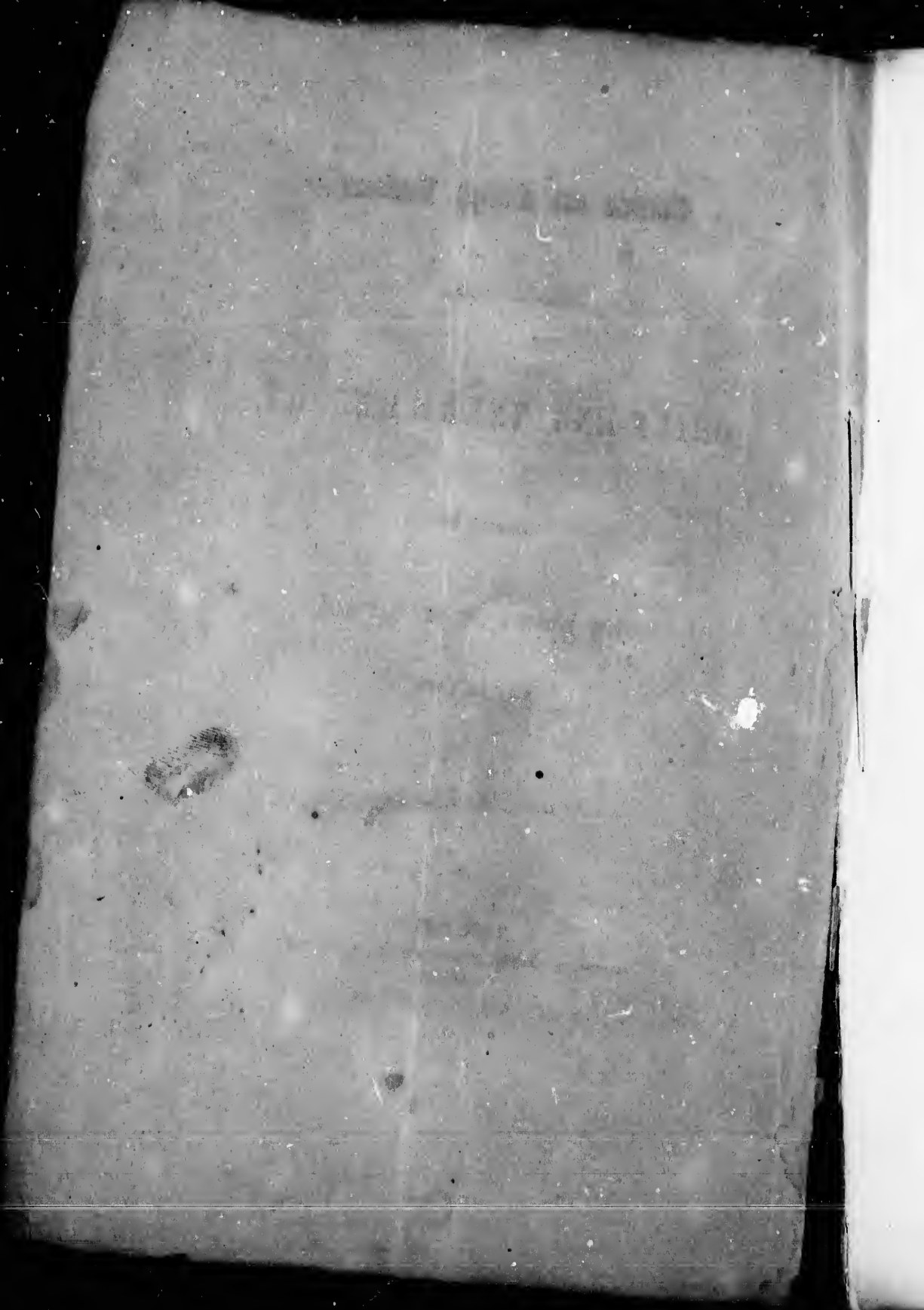


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Toronto and Guelph Railway.

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May 21, 1852.

TORONTO:

PRINTED BY BREWER, M'PHAIL AND CO., KING STREET.
1852.

TORONTO AND GUELPH
RAILWAY COMPANY.

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Vice-President.

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THE BANK OF UPPER CANADA.

REPORT.

ENGINEER DEPARTMENT, T. AND G. RAILWAY,
TORONTO, 21st May, 1852.

To JOHN G. BOWES, ESQ., *President*
Toronto and Guelph Railway Company.

SIR,—

The preliminary Surveys to determine the most eligible route for the proposed connexion of Guelph with Toronto, by Railway, which were committed to my charge by two resolutions of the late Provisional Committee, dated respectively 24th January, and 17th March last; being now brought to a close, I have the honor to submit the following report upon the results of those surveys, and the conclusions they induce me to form as to the selection of the line, which I deem it for the best interests of the Company to recommend.

The reports of progress submitted from time to time to the Provisional Committee, related entirely to one route; that which I have designated below as the "Central" one, passing through North Toronto Township and Esquesing, by Georgetown and Acton.

In order now to lay clearly before you the whole of the proceedings, I will, with your permission, review step by step, all that has been done since the commencement of operations, towards obtaining what I conceived to be of the highest importance to the success of your project, namely,—so thorough a knowledge of the topography of the region of country lying between the terminations of the proposed road,

as would satisfy the Board and the Public, that in deciding on the route to be adopted, due regard was had to combining as far as practicable the two great desiderata in all such cases: Economy of construction in the present, with the greatest probable amount of Commercial Usefulness in the Future.

I was called to this City towards the close of November last year, to treat with the Committee for the management of the work, but did not receive any definite instructions as to the course of operation to be pursued, until 3rd January, when the Secretary requested me to make such a reconnoissance of the line of country, through which, from an inspection of the map, it was presumed the road would pass, as would enable me to determine where the cost of surveys might be most judiciously incurred.

A reconnoissance of that nature I at once set about effecting, and on 23rd January reported to the Board, that the Engineering difficulties to be encountered were so much more formidable than I had been led to suppose, that before recommending any thorough survey being undertaken, it was desirable, in fact indispensable, to ascertain by instrumental examinations, at what point the summit of the elevation on which Guelph is situated, (being a continuation of the lofty table land, known at Hamilton as "Burlington Heights," and further West as "Flamoro' Heights,") could most easily be attained.

The ascent of those heights, from the abrupt front which they presented, forming a perpendicular and almost continuous rocky barrier, very lofty, and of transverse direction to your road, at once struck me as an obstacle for which you had not been prepared, and of such magnitude as might possibly altogether deter you from prosecuting your design.

I advised accordingly, that the surveys should be limited to an examination of the Mountain, until the existence of a practicable ascent had been placed beyond doubt, and was

authorized to carry out my views. Before organizing an Engineering staff, I deemed it advisable to devote some further time to exploring the opposing barrier referred to ; which object having engaged my personal attention until the middle of February, I came to the conclusion, as stated in my report of 15th March, that within the widest lateral range which I felt at liberty to assume for the location of your road, stretching from the Centre line of Trafalgar Township, on the South, to the Esquesing and Erin line, on the North, there exist but two routes whereby the summit of the table land can be reached by Railway, within the bounds of any possible outlay that you might be prepared or willing to incur.

The Committee having declined to fix, for my guidance, any intermediate localities to which the road was to be carried, I proceeded to select the *best route*, in an Engineering view, by taking measures to establish a just comparison between their topographical characteristics : and which could only be arrived at by careful and searching instrumental examinations ; because in both the passes referred to, the features of the Mountain front, elsewhere uniform and unbroken, are there so shattered and distorted by a long series of Geological changes, as to baffle the most practised eye to discover, that in point of cost, either route would have any decided advantage over the other ; though at the same time there might exist such differences between them, in the outward conformation of the ground, discoverable only by the spirit-level, as would largely affect the estimate of "Grading." I accordingly organized two exploring parties, instructing one, commencing at Milton, in Trafalgar, to run through the valley of the *Sixteen Mile Creek*, until the summit of the heights was reached, and so on to Guelph : the other, commencing at George Town, in Esquesing, to follow the Valley of the *West Credit River*, and extend their explorations also to Guelph. Those two streams, or their valleys, presenting the only "breaks" in the face of the precipice, through which a

direct rail communication between Toronto and Guelph, can in my judgment ever be effected.

Operations had only just been commenced, when I was instructed to the effect, that it was deemed inexpedient then to survey more than one route—and that the Northerly one, via Georgetown and the West Credit valley : I at once therefore altered my arrangements, by withdrawing the party from the Southern exploration, and sending it to the aid of that engaged in the Northern pass, where the very great and almost unprecedented depth of the snow, would in any case have demanded an augmentation of the force at first employed.

The actual surveys were not commenced until the 16th February. On the 15th March, I reported the existence of a practicable, but costly, route from Georgetown to Guelph, taking in Acton.

The practicability of the ascent being thus established, I was empowered to produce the Surveys from Georgetown, Eastward, to such point on the Main Credit River as I might find best adapted for conveniently crossing the stream and valley, and thence to seek the most direct practicable route to Toronto.

After a careful personal reconnoissance of the country from Georgetown to the Humber, I directed my assistant to guide the Surveys to Silverthorn's Mills, (Meadowvale,) in the Township of North Toronto ; at which place the banks of the Credit are less bold, and the facilities for bridging better, than at any of the many points examined higher up the stream. From Silverthorne's, the line was continued in a direct course to Fisher's Mills, on the Humber, and thence to Toronto, entering the City near the Toll-gate on Queen Street, and terminating at the Queen's Wharf.

On the 29th March, I submitted the result of this "trial line," showing that upon that course there exists a feasible route, presenting no difficulties that need deter the citizens of Toronto, and other Share-holders, from prosecuting an enter-

prize in which they had already embarked with so much spirit.

The "trial" Surveys so far made, were sufficiently searching, supposing the route to which they referred to be unconditionally adopted, to admit of the next important step being taken, namely,—the final "locating" of the road preparatory to its being declared open for competition to contractors.

As is usual in all such cases, however, considerable diversity of opinion existed, out of doors, giving rise to much Newspaper discussion, as to whether the *one* line examined was certainly "the best one," or whether the interests of the Company would not be better consulted, by ascertaining from actual survey, the comparative merits of certain other mooted routes.

Accordingly, on the 3rd April, I received a copy of a resolution, passed at the first session of the present Board of Directors, instructing me to survey a line "from Georgetown through Brampton to Toronto," or "any other line" that I might "deem advisable for the interests of the Company."

The responsibility of deciding on the route thus in a great measure devolving upon me, I pursued the course usually taken by Engineers under similar circumstances, namely,—that of providing myself with *facts* wherewith to sustain whichever route it might become my duty to advocate.

Such facts could only be gathered from instrumental examinations, and I accordingly exercised the power vested in me, by carrying out what I had designed in the outset of operations: Surveying each route under discussion, namely,—the Southern one, through the still untried valley of the *Sixteen*; and, below the Mountain, two others, North of the central one already run: the one passing through *Brampton*, the other through *Brampton* and *Weston*; being desirous, in arbitrating between the rival locations, of placing them before you in their true merits and in all their bearings.

This course was, I feel assured, the best for the interests

of the Company, because all experience in such matters goes to show, that so long as there exists the probability of improving upon a route, when the work must be of an expensive character, as in the case before us, the cost of thoroughly surveying the country is money judiciously laid out. It was also the course certain to prove eventually most satisfactory to the Board, as enabling them to meet the clamor amongst "those without," which local partialities and disappointed individual interests will ever give rise to, where a coveted prize has to be adjudged undivided to some one of many competitors.

I have compressed the foregoing preface into as small a compass, as a detailed exposition of the proceedings of the last four months seemed to me to admit of, and will now lay before you a sketch of each of the Routes explored, and which for perspicuity I designate as follows:—

- 1st, The "Southern" or "Streetsville and Milton" Route.
- 2nd, The "Central" or "Meadowvale and Georgetown" Route.
- 3rd, The "Humber and Brampton" Route.
- 4th, The "Weston and Brampton" Route.

To simplify the comparisons I am about to draw between the foregoing lines, I will here premise, that with the exception of the last named, one crossing point of the River Humber is common to them all, that being on Lot No. 8 of Etobicoke, a little below Fisher's Mills, where the valley of the stream is 750 feet wide, and the water 105 feet below the "Grade Line" of the Road; thence to the City limits, or to any point within the City, there are scarcely ordinary difficulties to stand in the way of construction.

The "Southern Route," departing from the Humber at the point above noted, is straight to where it intersects the Credit, close by and South of the Village of Streetsville; thence again, we have an almost undeviating straight line to Milton,

in Trafalgar, at which point, where we are 412 feet above the Lake, commence the difficulties of scaling the Heights. Leaving the Village of Milton close on the right, and passing a short distance in rear of "Peru Mills," the line follows the general direction of the Valley, having to cross the Sixteen Mile Creek twice within a distance of one mile, and at a least elevation of 30 feet above its waters.

On reaching the "Third Line" of Nassagaweya, we are clear of the valley and on comparatively even ground, but still ascending. In the first Concession of that Township, we reach the summit of the Table land, 920 feet above the Lake, being just 10 miles from the foot of the ascent at Milton, having in that distance risen 508 feet.

The Township of Puslinch is entered on Lot 18, and on the front of the tenth Concession, an abrupt rocky ridge, at right angles to the line, has to be crossed, the width of which may be taken at 4000 feet, and its elevation above the Lake 1011 feet; thence we have a direct route, nearly due West, to the Guelph boundary, enter that Township at the angle of the dividing line between Blocks C and G, and continuing on same course to the Town of Guelph, cross the Speed a little North of the Dundas Bridge, having altogether shunned the Eramosa Creek, which upon every other route surveyed, involves a crossing of no trifling magnitude.

The Central route is straight from the Humber to the Esquesing line, the Credit River being crossed, very favorably, at Silverthorn's Mills, in the third Concession of North Toronto. From the Toronto and Esquesing line to Georgetown, the course is perfectly straight, crossing the West Credit Stream, in the tenth Concession of the last named Township, and leaving Norval Village $1\frac{1}{4}$ mile to the North.

At Georgetown, which stands 635 feet above the Lake, the ascent of the mountain on this route may be said to commence, as it does at Milton on the other. Leaving Georgetown, the line has a direction about S. 70° W., passes Clendin-

an's Mills in the sixth, and Lawson's Mills on the fourth Concession, and so on to Acton; $1\frac{1}{2}$ mile beyond which place, the summit is attained, 971 feet above Lake Ontario, and 336 feet above Georgetown, from whence it is distant 7 miles.

From this summit to Guelph, I have had three surveys made; two only of the lines are practicable; one of them follows the old course traced by Messrs. Brough and Wells; the other, more northerly, passes near the Mills at Rockwood. Those two routes converge to the same point on the River Speed at Guelph, close by Allen's Mills; the latter line, that via Rockwood, has in every respect the advantage of the other, and would be the one adopted, should the "West Credit" Route come to be elected over that through the valley of the "Sixteen."

As those two routes, Nos. 1 and 2, are to be compared with one another throughout their entire length, I shall proceed to strike a balance between them, before touching on the other two, both of which have reference to the *Eastern* section of the road only.

The characteristics of all that portion of the "Southern line," lying below the Mountain, are generally similar to those of the corresponding portion of the "Central Line." In point of directness they are about equal, and so with regard to the River crossings. On both, there exists a most objectionable ridge, dividing the Etobicoke valley from that of the Credit, and which in both cases would compel us to adopt a gradient of 53 feet in the mile for a distance of $2\frac{1}{2}$ miles.

From the crossing of the Main Credit, on the Central Route, to Georgetown, 10 miles, the character of the work would be neither very heavy nor expensive, except at the crossing of the West Credit stream, and the maximum gradient 47 feet per mile.

On the Southern Route, after the Credit has been crossed at Streetsville, a sudden descent in the ground, and, further on, an abrupt "step" bars the way, again forcing us to the

expedient of a 53 feet gradient, for a distance of $1\frac{1}{2}$ mile, and even that would be obtained by recourse being had to a cutting of 40 feet in depth, and an embankment of great length, varying in height from 30 to 46 feet. This plane added to that on the east side of the Credit, gives 4 miles of 53 feet gradient, below the mountain, on the Milton route, against $2\frac{1}{2}$ miles on the Georgetown line; a feature, which alone, even were the advantage in point of cost not ranged upon the same side, entitles the *Eastern* section of the Central route to an unqualified preference over its Southern rival.

But it is on the merits of the portions lying West from Milton and Georgetown, that the verdict will mainly hinge.

On the Southern route, the general summit of the table land is 920 feet, on the Central 971 feet above Ontario. In the former case, the highest point is reached in a distance of 10 miles from, and an elevation of 508 feet above, Milton; in the latter case, from Georgetown 7 miles, and above it 336 feet, those two places being assumed as the "foot of the mountain" on their respective routes.

The above figures, comparing heights to be overcome with distances, show a balance in favor of the route through the West Credit valley, over that through the valley of the Sixteen Mile Creek; in addition to which, the "rise" is more evenly distributed over the whole distance on the former, than on the latter line, where the profile presents a series of abrupt "steps," which would cause the cuttings, in seeking for similar *grades* (53 feet per mile), to compare *impracticably* with those on the West Credit Route; and with similar cuttings, we would have to put up with 4 miles of 70 feet gradient and a startling amount of rock excavation.

In point of "allignment" the more Northerly is also the more desirable route; there being from Georgetown to the summit but two gentle deflections called for, whereas the other demands three, of much lesser angle, in order to adapt itself to the sinuous windings of the valley.

From the summit to Guelph, the superiority of the Northern over the Southern Line is so decided, as scarcely to call for comment; it will be sufficient to say, that the former has a gentle and uniform descent, the whole fall, westwardly, from the summit to the market square in Guelph, being 171 feet: on the latter, a rocky ridge is intersected, standing up 90 feet above the general surface of the mountain top, and having a base of about 4000 feet in width.

The surveys of both these routes have been made with such care, as to warrant me in pronouncing that the following facts have been fully and fairly substantiated:—

1stly, That the Eastern Section of the Streetsville route would require two 53 feet gradients, isolated from one another, of the combined length of 4 miles, whilst the corresponding portion of the Meadowvale line shows a necessity for but one such plane, the length of which would be $2\frac{1}{2}$ miles.

2ndly, That the Western Section of the former line would exact a maximum gradient of 70 feet per mile, for nearly 4 miles; and 2 more miles of 53 feet ascent per mile; whereas the Georgetown route admits of the summit being attained at less cost, in a distance of 6 miles, and on the least of the gradients above specified.

3rdly, That the amount of curvature is greater, and the character of the curves more objectionable on the Sixteen Valley route, than on that through the valley of the West Credit.

4thly, That a glance at the "profiles" is sufficient, without going into any calculations whatsoever, to show that, in comparing those two routes, the pecuniary interests of the company point to the one via Georgetown and the West Credit Valley: and

Lastly, As I cannot detect any probable commercial superiority, that a Railway as far South as Streetsville and Milton, (Trafalgar,) could possess over one no farther North than Meadowvale and Georgetown; I am very decidedly of

opinion, that in every point of view the interests of the Company forbid the selection of the Southern line for the location of the Toronto and Guelph Railway ; and that therefore, as regards the ascent of the Heights, the proper route for the road is through the valley of the West Credit River.

GEORGETOWN thus established as a tangential point for the road, the question next arises, whether, from there Eastward, it will be better to take the route above described, via Silverthorn's Mills to the Humber, or to steer more to the North, so as to touch at BRAMPTON.

The trial line No. 3, which I have had run for the purpose of testing the merits of such a route, crosses the Main Credit River $1\frac{1}{4}$ mile above Norval, where the valley of the stream, being the most favourable crossing point thereabouts, is 800 feet wide, and its water 110 feet below the Grade Line of the Road, involving the necessity of a very costly Bridge structure and a vast embankment.

This is the most unfavourable feature of the "Brampton Line," and compared with the crossing of the same River on the "Central Line," is a *very* unfavourable one ; from the Credit to Brampton village, and thence through the Townships of North Toronto and Etobicoke to the Humber, the "contour" of the ground is generally favourable for the economical construction of a Railway, and the natural outline of the surface can be judiciously conformed to without resort being had to any gradient exceeding 40 feet in the mile.

In arbitrating between this and the Central line, the chief points of difference occur, in the number and magnitude of the streams to be crossed, and the *grades* that can be obtained.

As respects length and allignment, neither can be said to have any decided advantage of the other, nor can I see that either could justly claim any commercial superiority.

The prevalent idea, that to secure the carrying trade of intermediate and neighbouring towns and villages, Railways must pass *through* them, is generally erroneous. All railways

possess a more or less extended "circle of attraction," and despite of the opposition growing out of local prejudices, and petty individual interests, the whole commerce of the region within the limits of that attraction, will, in the end, be carried on through the medium of the rail. I shall therefore confine myself simply to the *Engineering* merits of the two lines under discussion.

The Central Line crosses (between the Humber and Georgetown,) the Mimico, the Etobicoke, the Main Credit, and the West Credit Streams, the cost of each crossing ranging from £5,000 to £10,000.

The Brampton route avoids the Etobicoke altogether, or at least intersects it at a point where it has dwindled down to an insignificant brook. It also escapes the West Credit River, which upon the other route ranks as the most expensive of the crossings; the bridging on this, the Brampton line, therefore, is confined to the Mimico and the Main Credit stream, the former of no greater magnitude than on the rival line; the latter presenting a barrier of rather startling aspect, the bottom of the ravine in which the stream lies being 110 feet below "grade," and to ensure a safe and permanent crossing over which, will call for an expenditure of not less than £25,000; upon the whole, the crossings of the *four* streams upon the Central, can be effected at a considerable saving of cost over the *two* upon the Brampton Line.

Next, as regards *Grades*:—That in ascending the mountain we should be driven to adopting as steep a maximum as 53 feet in the mile, was entirely unlooked for when your project was first mooted; but that such a necessity should also exist below the mountain in the apparently level Township of Toronto, must at first sight appear improbable; such, however, is the fact as regards two of the routes already described, the Southern and the Central.

In overcoming the ascent of the mountain by such a gradient, I would consider a couple of miles more or less of

continuous grade as of no very material consequence, but detached and isolated inclines of that nature must *if possible* be avoided *even at an increase of cost*.

Fortunately such a possibility exists, by incurring a trifling increase of distance and no increase of outlay; this is to be effected by adopting the BRAMPTON ROUTE, which in every Engineering point of view, save the chasm at the Main Credit river, is as much superior to the Central route, as I have already shown the Central to be superior to the Southern.

The portion of the above line lying between Toronto and the Humber, at Fisher's, and thence to Brampton, has still to undergo the ordeal of comparison with a line from Toronto to Brampton, via Weston. The distance from this City to Brampton by the former route is $20\frac{1}{2}$ miles, and by Weston $21\frac{8}{10}$ miles, showing, in point of length, a difference in favour of the Hunter Line of $1\frac{1}{2}$ miles.

But the most prominent feature on which to institute a comparison between these routes, is the crossing of the River Humber, the water of which at Fisher's is 105 feet below the grade of the road, and the Valley 750 feet wide; at Weston, the water 55 feet below grade, and width of valley 900 feet. In other words, the crossing of the Humber can be effected for less outlay at Weston than at Fisher's, by from £8000 to £10,000.

As respects the other features of No. 4 route, the ground from Brampton to Weston is very favorable; from Weston to the City I have had no survey made, having, through the kindness of the Engineer of the Northern Railroad, been furnished with the notes of a trial line run by them, and which shows a highly favourable Section, demanding no grades of greater elevation than 40 feet in the mile.

I refer you to the attached Estimate tables (vide Schedules A and B) for the cost of this compared with the other routes examined, and from which you will see, that it is not only least in cost per mile, but that the total cost of this, the longest of

the routes, is lower than that of any other line, the next lowest being the line to Brampton by the Humber.

I have endeavoured to place the relative merits of the several lines talked of and explored, as clearly as possible before you, and carefully weighing all the points of comparison, cannot pronounce otherwise, than, that the one that offers the greatest facilities for construction is entitled to the preference. That one is Route "No. 4," passing through Weston, Brampton, Georgetown, and Acton; its sole objectionable feature, as compared with "No. 3," (the only one of all the others that can compete with it,) being its greater length, and which is too inconsiderable to outweigh the other advantages set forth.

But there is another question, still undiscussed, that may render it advisable to leave the final decision between these routes some time longer in abeyance; I allude to the obtaining of the "right of way." Beyond all doubt, the most expensive portion of your line in that respect will be found in the Townships of York, Etobicoke, and Toronto; and whilst the question of "location" is still, as regards that Section of the route, an open one, "Releases" may be obtained on more favourable terms; or it might be, that that very question would assume so important an aspect, as to be the one on which the final judgment should be rendered.

As regards the ESTIMATES—

The amounts of excavation, &c., in the several lines surveyed, have been carefully ascertained, and such "margin" allowed in calculating the quantities, as to ensure the estimate being ample to cover the cost of construction.

The results of the measurements and calculations are given in tabular form in appendices A and B, herewith submitted. You will there observe, that the Weston Route "No. 4," is cheaper than the next cheapest, "No. 3," (via the Humber

and Brampton,) by £350 per mile, the cost of the former being estimated at £6350, of the latter at £6700 per mile.

Appendix D shows the number, magnitude, and cost, of the several streams and valleys to be crossed, and to which will be due upwards of one third the whole cost of graduation.

The amount of rock excavation may be considerably reduced, provided that at the lofty rock ridge near Clendinan's Mills in the Fifth Concession of Esquesing, a *Tunnel* can be substituted for a *thorough cut*, but of this I am doubtful until closer examinations have been instituted; the rock is so much "displaced" and shattered, as, I fear, to render it too unsound to admit of a *Tunnel* being safely resorted to; I have consequently based my estimate of this part of the work on the supposition of having to adopt the most costly expedient.

At some of the least considerable of the crossings, a saving of some thousands of pounds may probably be effected, by recourse being had to "Trestle-work" structures, of Timber, instead of the imperishable but more costly combinations of earth and stone; but in this case too, I have assumed the highest estimate, and calculated for permanent structures at all the crossings: because whatever reductions might be effected in the ways suggested, they might again be swallowed up by unforeseen casualties, from which few great public works are wholly exempt, and against which no human foresight can entirely provide.

The sum assumed to cover "Lands and Damages," has been put down from no ascertained data, as I have as yet had no reliable means of learning how far the "liberality" of the farmers along the line of road is to be counted upon; but if I have *under-estimated* this item in the cost of your undertaking, it arises from my having *over-estimated* the *patriotism* of the population with whom the Land Commissioner has to deal.

The CHARACTERISTICS OF THE ROAD, in its completed form, will upon the whole, be favorable.

In point of directness, it will, practically, differ very little

from a straight line ; the longest of the routes exceeding but by $2\frac{1}{2}$ miles, (equal to about 10 per cent,) an *air line* between the terminating points. Few roads, in fact, through a similar region, could show more favourable allignement. On the Eastern Section, we have tangent lines of from 3 to 12 miles in length, the curves being described by radii of more than two miles ; on the Western Section, there are two curves of 3820 feet radius, whilst the radii of the remainder will vary from one to two miles in length.

As regards *Grades*, there are no ascents *Eastwards*, or in the *direction of the trade*, to exceed 36 feet per mile ; and *Westwards*, the up grades do not exceed 40 feet, except on the immediate ascent of the mountain, where we have 6 miles of 53 feet elevation per mile, and on that portion of the route there is only one deviation from a straight line.

Appended to this report is a Table of Grades, (vide appendix C.) showing how the Gradients compare on each of the surveyed lines ; in that table, the lengths of the several lines are also given.

Before closing this report, I deem it necessary to say something with respect to the *TERMINI*, a question, on which, generally, there is more diversity of opinion amongst parties interested, than on any other of the many disputed points inseparable from the selection of a line of Railway. First then, as regards the

WESTERN TERMINUS.

The Line, the adoption of which I have recommended above, crosses the River Speed, and enters the Town of Guelph close by Allen's Mills. The Town being once fairly entered, the sooner the Terminus is reached the better :—the direction in which we cross the River, carries us into the market square, an open, roomy space, well adapted for all the purposes of a Railway station ; the same line produced,

would carry us *through* the Town on favorable grades, should it ever be found desirable to extend the road further Westward. I therefore recommend that the Market Square of Guelph be selected as the Western terminus of the road; provided always, that the requisite facilities for adapting it conveniently to the necessary purposes of a Railway Terminus, be afforded by the Townspeople; otherwise, the next most fitting spot for the Station would be found near the Western limits of the Town plot, in rear of the Catholic Church hill.

EASTERN TERMINUS.

In selecting the fittest place for the City Termination of the Road, we must look very far beyond the present time, and lay our plans with a view to extending, with the least expense and in the most convenient manner, the advantages of Railway connexion not only to the limited number of landings now existing, but also to the shippers, merchants, and others, who, beyond all doubt, will in a few years hence, have warehouses and wharves where now there is but waste ground and water.

Towards effecting this object, one thing I look upon as indispensable:—The direct connection of the Track with the Lake. Next to be considered is, in what way that can best be carried out, so as to accommodate the greatest number of the community and the greatest variety of trade.

The city of Toronto stands unrivalled amongst our inland Ports, for the fine harbourage afforded by its magnificent Bay, *accessible at all seasons*: this, joined to the rich agricultural region immediately surrounding it, and extending far away to the west and north west, together with the immense traffic to be attracted to it from without the Province, by the railways now projected or in progress, will forever render it the principal focus of the inland Marine trade of Western Canada; with this in view, I conceive that, now, in the outset of

your railway schemes, it is of the very highest importance to the interests of the city and its connexions, that the first step in constructing a railroad terminus should be designed merely as a part of a *future* Marine Depot of vast extent, taking in, I should say, the whole navigable front of the City.

With the details of a plan for such a Depot, I am of course, not yet prepared; they must be the result of long and careful consideration; but I will here give a general sketch of the design I propose; which will be rendered more intelligible by referring to the outline plan herewith laid before you, and which in its general effect, when completed, would not differ very much from the talked of "Esplanade."

The line, as I have already stated, reaches the city limits on Queen Street, (at the Toll Gate):—thence it is produced till it strikes the Lake a little west of the "Old Garrison," whence it curves so as to cross the Queen's Wharf close in shore, at which point the track should be about 5 feet above the water (the level I propose for the terminus.)

From the point of reaching the Lake, there are to be two or more parallel tracks, the inner one, that next the shore, to be appropriated to Passenger-trains only, and to be continued down to whatever point may hereafter be selected as most suitable for the Passenger Station, probably the foot of Yonge Street.

On the other track, or tracks, Freight-trains come in, and from them curved "Sidings" can branch off to each Wharf that may from time to time be constructed.

I would suggest that the water front, (I speak of course with regard to the portion still unoccupied,) instead of being formed into one continuous quay, should be occupied by projecting "Piers," or "Jetties," of about 250 feet front and depth, with "Slips" between them wide enough to admit, side by side, two vessels of the largest class, that each may lie broadside to a wharf.

In this way, the greatest possible extent of water frontage

can be secured to the city, and the whole of it placed in direct connexion with the Railways.

The cars arriving by each train for any particular forwarder or shipper, with his name, or the number of the wharf, chalked on them, can be cast off as the train passes the wharf, "switched on" to the siding, and hauled by horses down to where the vessels lie, and where by a simple arrangement of "Turn Tables" they can be laid along the front and each side of the pier, and the process of loading or discharging be going forward from three Vessels or into three warehouses at the same time.

Whether those wharves should be the property of the Company, or of the city, and by them leased out to individuals, or whether it would be better that their construction should be the result of private enterprise, will be matter for future consideration, as also the terms on which the side tracks would be laid and maintained for their accommodation. In the way above suggested, the whole front of the town can by degrees be converted into a Vast Railway Depot, unsurpassed anywhere in extent and convenience; the plan could be carried out too, without at all injuriously affecting existing individual interests, or, what is scarcely less desirable, interfering with the streets of the city.

The completion of a design such as that above proposed, *will be a work of time*, and is not to be thought of as part of your present scheme; the earlier requirements of trade will neither demand such extensive terminal arrangements as therein contemplated, nor would the estimate on which the cost of your road is based, warrant the very great outlay involved in the construction of so large a Depot.

I would however advise the construction, simultaneously with the remainder of the Road, of a double track, from the point of striking the Lake as far Eastward, at least, as the front is still Public property, and the cost of which, *per mile*,

would not much exceed the average of other portions of the work.

Further extension to accommodate existing places of business, could be effected at comparatively small outlay, the burden of which would probably be borne, at least in part, by those for whose accommodation it would be undertaken.

I think it advisable that the Engine Houses, Car Depot, Machine Shops, &c., should be situated just without the limits of the city, and from these, Freight Trains would take their final departure. A small "Service Engine" is despatched from the Engine yard to run along the water front, collect the outward bound cars from each wharf, and bring them up to where the Freight Engine is in readiness to be attached to them; the cars are there "marshalled," and the Train despatched on its destination.

There is still another question arises, in deciding on the plan and position of a terminus for the first requirements of the road.

Below the Queen's Wharf, the harbour is ice-bound for, it is safe to say, four months of the year, during which time steamers are plying on the Lake without; and probably, in the whole course of the Winter, there is not a week in which the Queen's Wharf is inaccessible to them.

To provide for the accommodation of Trade during that season, it is very essential that there should be a terminus on open water, so planned as to be a link in the formation of the general Depot already described.

Such a terminus I would propose to form, by constructing a dock in 11 feet water, with a front of from 1000 to 2000 feet in length, extending in equal portions above and below the Queen's Wharf; the water space between the dock and the shore to be formed into dry land by the material which must necessarily be excavated from the cut through which the Track is to be conducted to the water level.

Before closing upon this subject, I would beg leave to re-

peat, that as regards terminal accommodations, the wants of trade will quickly make themselves heard, once your road is in operation.

Your wisest policy will be, to keep pace with, rather than anticipate, those wants, and to limit the first expenditure on the city terminus within narrow bounds. Many Railroad companies have crippled their resources by sinking too much capital in stations, buildings, &c., and the premature expenditure of 20, 30, or £50,000 on a road of under 50 miles in length, could not fail to have a depreciating influence on its Stock.

I have not as yet had time to collect any statistical information, to show the present and probable prospective resources of the country on and in connection with the line of road, but at some future date, when I come to lay before you a report on the final "location" of the work, I trust to be able to show from the census returns of the counties, that the project cannot fail of being a safe investment.

In order that the work may be put under contract this season, the "locating" of the Line, and surveys of the lands required for it, should be prosecuted forthwith.

The General Railway Act would seem to require the completion of the latter branch of the work, before the grading can be commenced.

I am,

Sir,

Very respectfully yours,

W. SHANLY.

(A)
Comparative Estimates of Cost of Grading.

NAME OF ROUTE.	Length in Miles.	EXCAVATION.		Masonry. c. yds.	Clearing. acres.	Grubbing. rods.	Bridge Superstruc. feet.	Total Cost.			Average Cost per mile. £
		Earth. cub. yds.	Rock. cub. yds.					£	s.	d.	
1 Southern.....	46 $\frac{60}{100}$	3,356,000	400,000	32,400	200	8000	500	281	13	4	6115
2 Central.....	46 $\frac{18}{100}$	2,880,000	125,000	31,200	200	8000	1025	207	200	0	4500
3 { Brampton by Humber.... }	46 $\frac{31}{100}$	2,700,000	125,000	37,200	200	8000	865	205	170	0	4400
4 { Brampton by Weston..... }	47 $\frac{50}{100}$	2,500,000	125,000	34,800	200	8000	985	193	963	6	4100

(B)
Comparative Estimates of Total Cost of Road.

NAME OF ROUTE.	Length in Miles.	Graduation and Bridging.	Superstruct.	Lands and Fences.	Termini.	Contingencies.	Total cost	Average Cost per mile.
		£	£	£	£	£	£	£
1 Southern, or Streetsville and Milton...	46 $\frac{60}{100}$	281,316	68,735	12,000	10,000	15,000	357,051	8114
2 Central or Meadowvale & Georgetown	46 $\frac{18}{100}$	207,200	68,050	12,000	10,000	15,000	312,250	6760
3 Brampton by Humber	46 $\frac{31}{100}$	205,170	68,500	12,000	10,000	15,000	310,670	6700
4 Brampton by Weston.....	47 $\frac{50}{100}$	193,963	70,000	12,500	10,000	15,000	301,463	6350

The above Estimates are based on terminating the Road at the Queen's Wharf.

(C)
Comparative Table of Grades.

Gradient per Mile.	GRADES WESTWARD.											
	SOUTHERN ROUTE.			CENTRAL ROUTE.			BRAMPTON BY THE HUMBER			BRAMPTON BY WESTON.		
	No. of Planes.	Length Miles.		No. of Planes.	Length Miles.		No. of Planes.	Length Miles.		No. of Planes.	Length Miles.	
70.....	1	Ascendg	Level.	2	Ascendg	Level.	1	Ascendg	Level.	1	Ascendg	Level.
53.....	1	2.75	.....	1	1.50	.....	1	6	.....	1	6	.....
47.....	1	2	.....	1	2.50	.....	3	8	.....	3	3.75	.....
40.....	3	5.75	.....	1	8.25	.....	6	11	3.50	9	9.50	3.50
30 to 40.....	2	4	.....	4	1.50	5.25	5	6.75	4.75	7	4.75	7.75
20 to 30.....	6	3	2	4	4.75	5.50	5	5	6.31	6	.....	.....
20 and under.	5	9.25	5.50	4	.....	7.93	5	.....	.....	.....	.....	.....
Level.....	4	.....	8.35	7	.....	.....	.....	.....	.....	.....	.....	.....
		30.75	7.50	27.50	10.75	7.93	31.75	8.25	6.31	27.75	11.25	8.50
			8.35									

Comparative Table of Grades—continued.

Gradient per Mile.	GRADES EASTWARD.															
	SOUTHERN ROUTE.				CENTRAL ROUTE.				BRAMPTON BY THE HUNBER.				BRAMPTON BY WESTON.			
	Length Miles.		No. of Planes.	Length Miles.		No. of Planes.	Length Miles.		No. of Planes.	Length Miles.		No. of Planes.	Length Miles.		No. of Planes.	
Ascendg	Descendg	Ascendg		Descendg	Ascendg		Descendg	Ascendg		Descendg	Ascendg		Descendg	Ascendg		Descendg
70.....	1	4.	1	9.	1	6.	1	6.	1	6.	1	6.	1	6.		
53.....	1	2.75	1	1.50	1	2.50	3	8.	3	3.75	3	3.75	3	3.75		
47.....	1	2.	1	2.50	1	8.25	3	8.	3	3.75	3	3.75	3	3.75		
40.....	3	4.	4	1.50	4	1.50	6	11.	6	3.50	9	3.50	9	3.50		
30 to 40.....	2	4.	4	1.50	4	4.75	5	6.75	5	4.75	7	7.75	7	7.75		
20 to 30.....	5	2.	4	5.25	4	5.50	4	7.93	5	8.25	6	11.25	6	11.25		
20 and under.	5	5.50	4	7.93	7	7.93	5	31.75	5	31.75	6	27.75	6	27.75		
Level.....	4	7.50	7	10.75	7	10.75	7	6.31	7	6.31	6	6.31	6	6.31		
		30.75	8.35	27.50	7.93	27.50	7.93	6.31	31.75	6.31	31.75	27.75	27.75	8.50		



